

Biocities e forestazione urbana: riportare la Natura in Città

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**Venerdi Culturali, Federazione Italiana Dottori Agronomi e Forestali
Roma 24 marzo 2023**

La Trilogia ONU sulla Sostenibilità: *Rapporto Stern* sul Cambio Climatico, *Rapporto Dasgupta* sulla Biodiversità, *Rapporto sull'Economia dell'Acqua*



Turning the Tide A Call to Collective Action

by the Global Commission on the
Economics of Water

Turning the Tide A Call to Collective Action

March 2023

 www.watercommission.org

The Global Commission on the Economics of Water has published the following two documents in March 2023. The Commission will be issuing its final report in 2024.

'Turning the Tide: A Call to Collective Action' was formulated by the Co-chairs of the Global Commission on the Economics of Water, drawing on the combined experience, insights and views of the Commission.

turningthetide.watercommission.org

The What, Why and How of the World Water Crisis: Global Commission on the Economics of Water Phase 1 Review and Findings, a research document that reviews and updates data and knowledge relating to the global water crisis, was formulated by the Lead Experts of the Global Commission on the Economics of Water, and draws likewise on the contributions of the Commissioners and Advisors.

watercommission.org/publication/phase-1-review-and-findings

VI Report IPCC sui Cambiamenti Climatici

The warning

Pace and scale of climate action are insufficient to tackle climate change

Sixth Assessment Report

Synthesis Report

20 March 2023

Gli impatti aumenteranno in 4 settori: acqua&cibo, salute,città, ecosistemi

Adverse impacts from human-caused change will intensify

Water scarcity and food production



Health and wellbeing



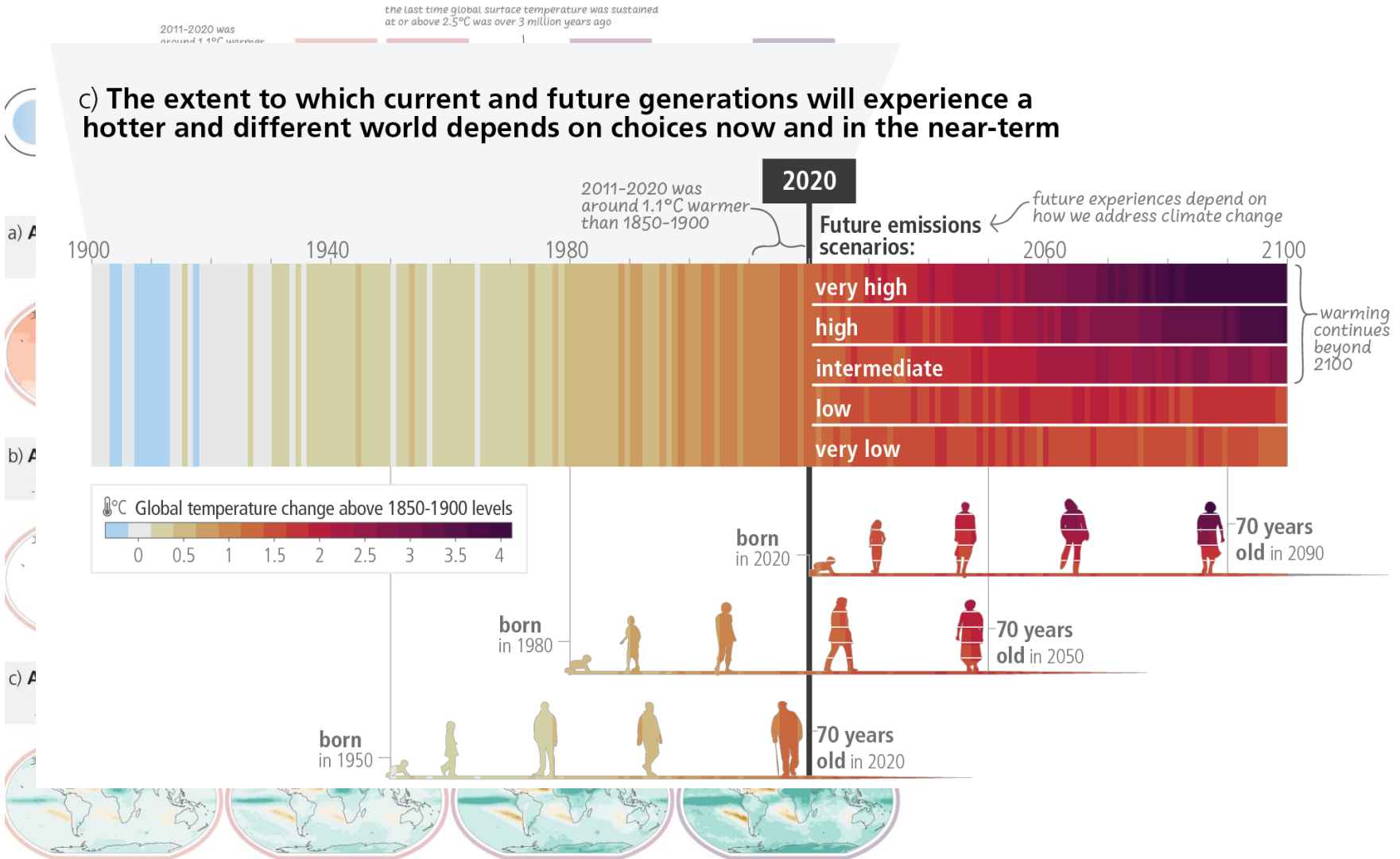
Cities, settlements and infrastructure



Ecosystem structure, species range shifts and changes in timing



Impatti su temperatura, umidità del terreno, pioggia e sulle persone



Nel 2050, il 70% della popolazione mondiale vivrà in città



Source: <https://www.thenationalnews.com/opinion/explaining-the-psychological-challenges-of-population-growth-1.619310>

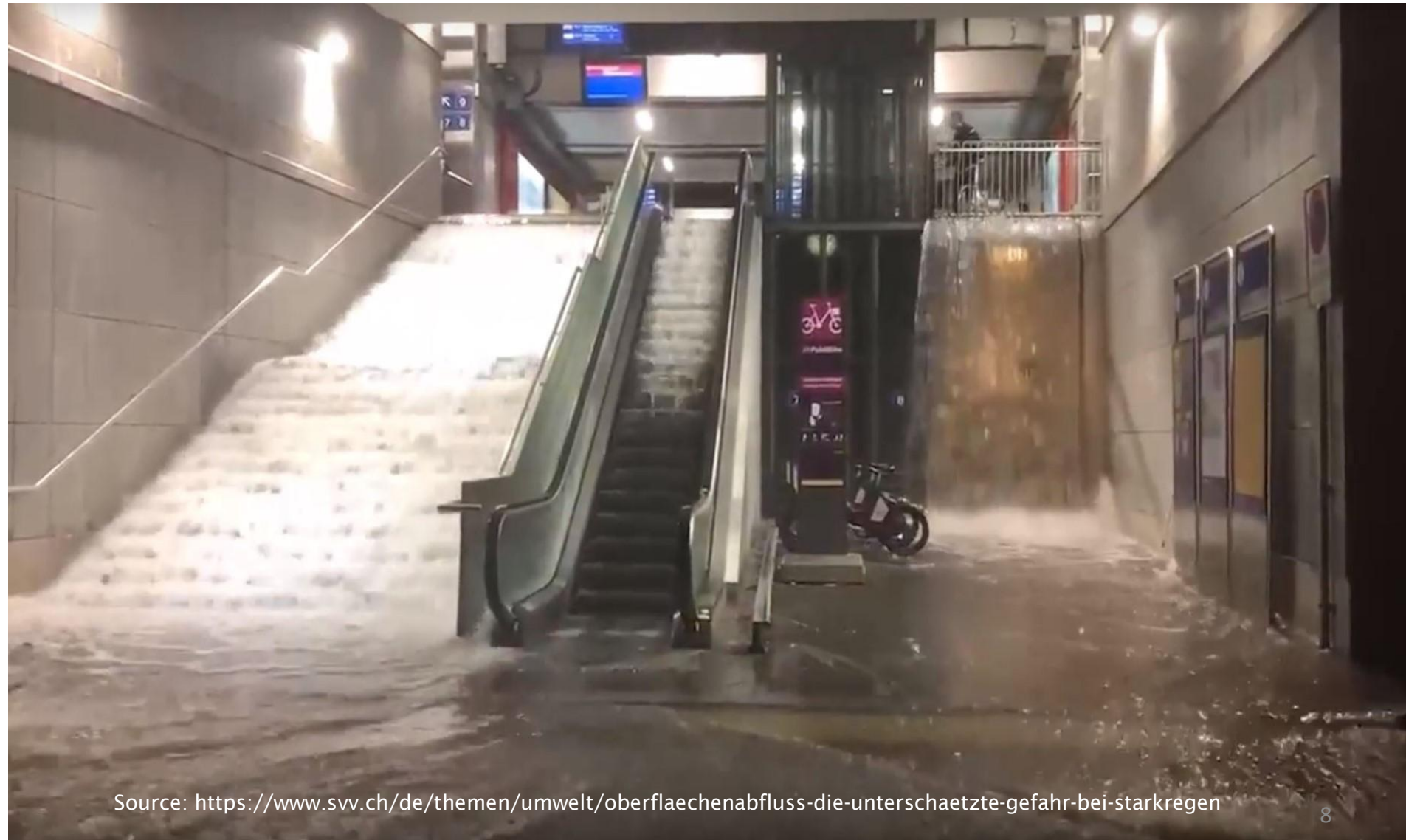
Le città consumano 2/3 dell'energia globale, producono il 70% di emissioni GHG



Source: https://www.main-spitze.de/panorama/aus-aller-welt/hoch-hoher-frankfurt-es-gibt-immer-neue-hochhauser_18571440

Forti impatti dei cambiamenti climatici

Lausanne 2018: 41 mm di pioggia in 10 minuti



Source: <https://www.svv.ch/de/themen/umwelt/oberflaechenabfluss-die-unterschaetzte-gefahr-bei-starkregen>

...verso le BIO(based)CITIES!

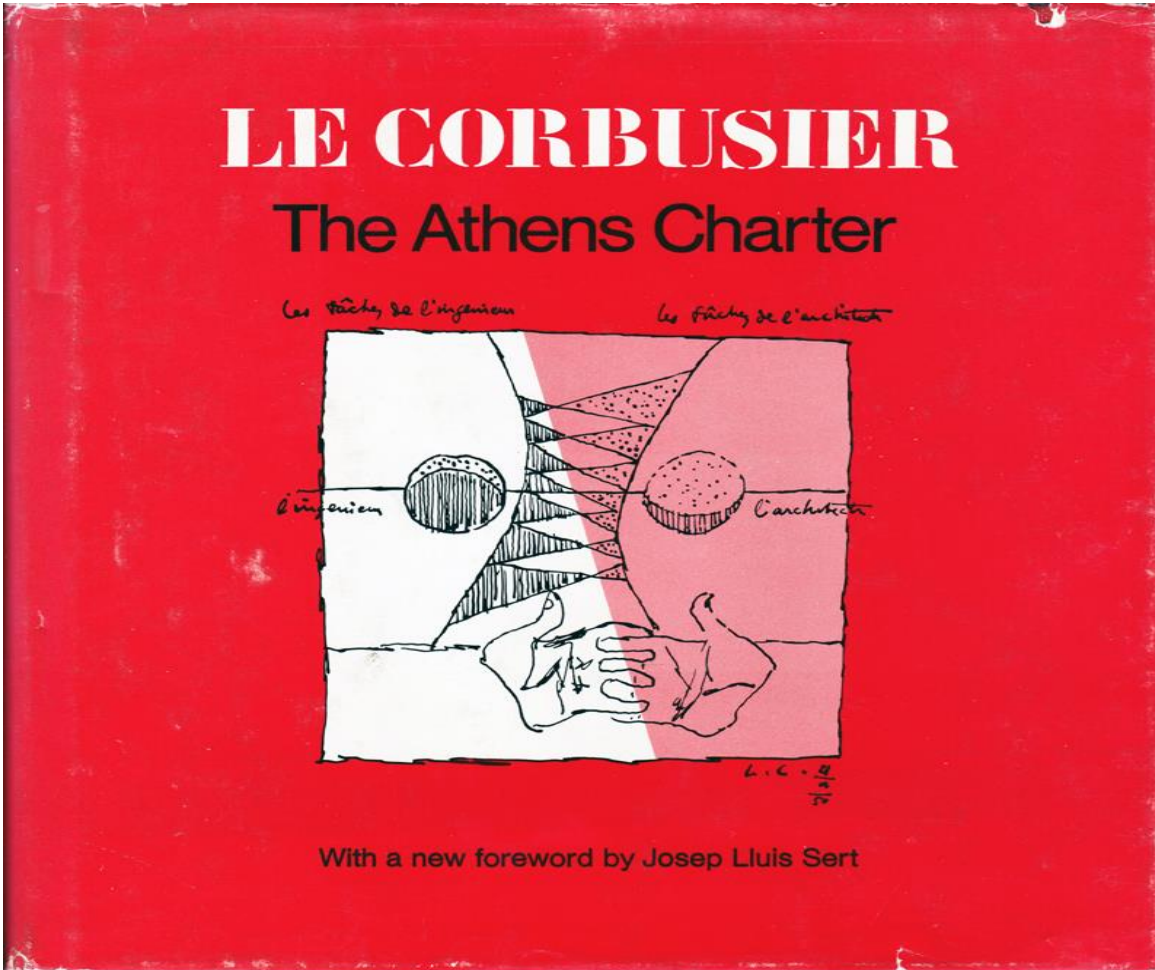
9



Source: <https://www.l'espresso.com/cultura/g.corriere.it/tendenze/architettura/bosco-verticale-milano-10-cose-che-non-sapete/>

La Carta di Atene del 1933

il manifesto urbanistico che ha guidato l'architettura e la progettazione urbana di tutto il '900 è stata firmata dai più grandi architetti dell'epoca, Le Corbusier, Gropius e Aalto

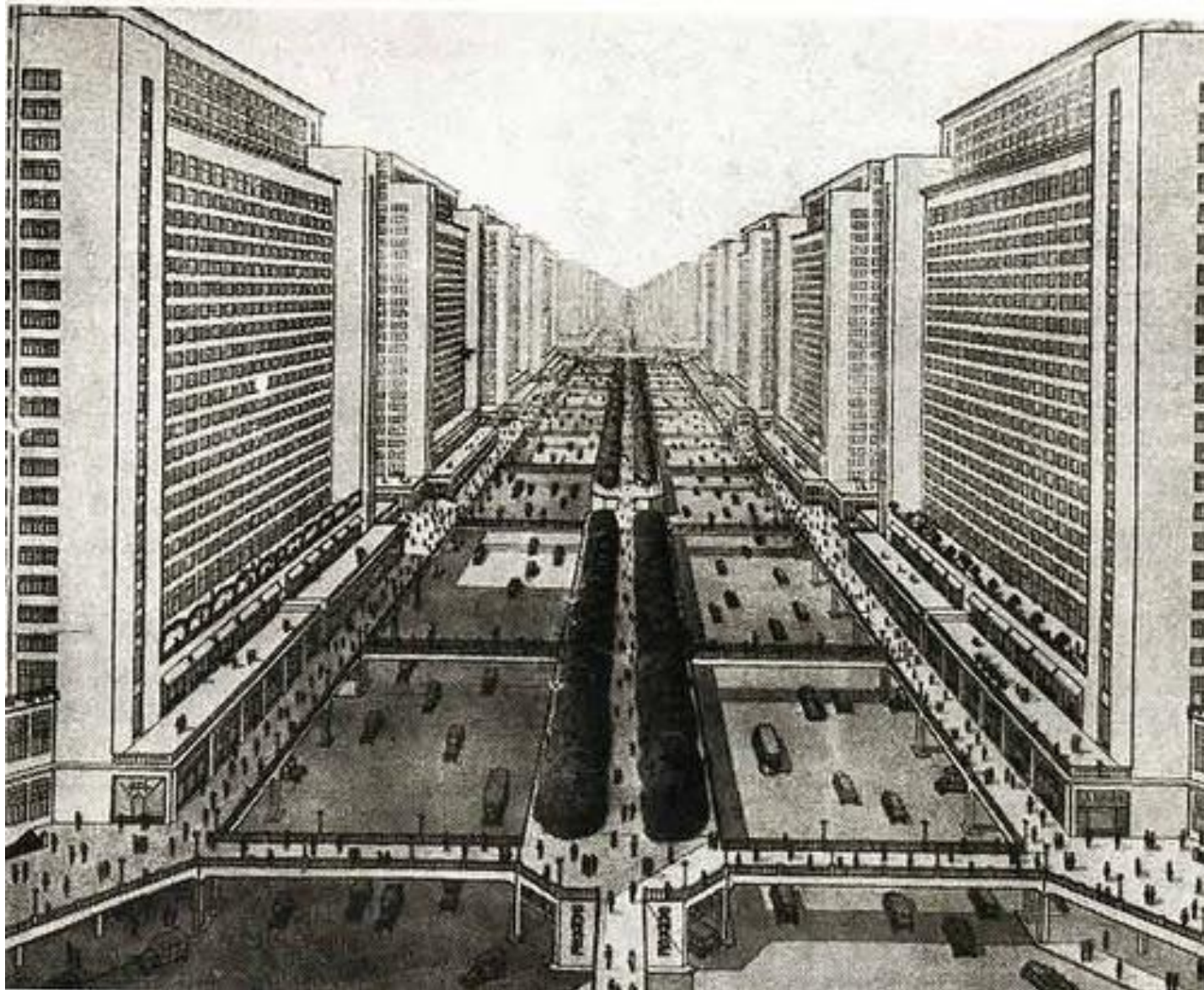


Le Corbusier dava una grande importanza alla illuminazione e alla radiazione solare diretta per le abitazioni e il benessere dei cittadini



Ville Radieuse, Le Corbusier 1930

Progettata in funzione della radiazione solare, città verticale e lineare, ampio uso di cemento armato, accentuata divisione del lavoro e degli spazi urbani, estese infrastrutture di trasporto, mobilità privata con auto, ampi spazi verdi separati dalle abitazioni



Brasilia, di Costa, Niemeyer, Burle-Marx (su ispirazione di Le Corbusier) 1956-1960



ROMA all'Unità' d'Italia: una biocittà?

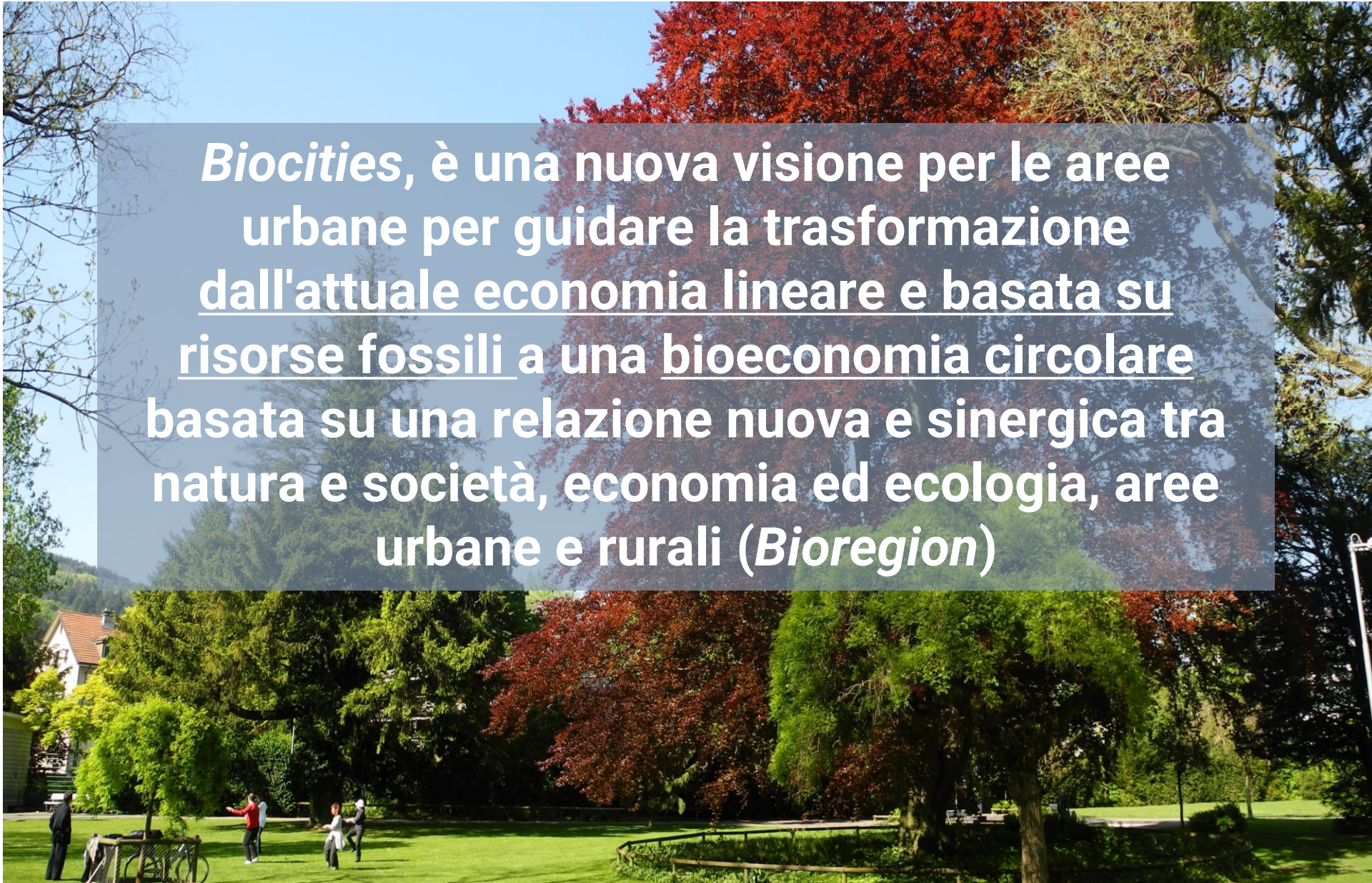
(foto storica a Porta Pia nel 1870, alberi e parchi dentro e fuori le mura)



(Ludovico Tuminello, 1870)

Cos'è una Biocittà?

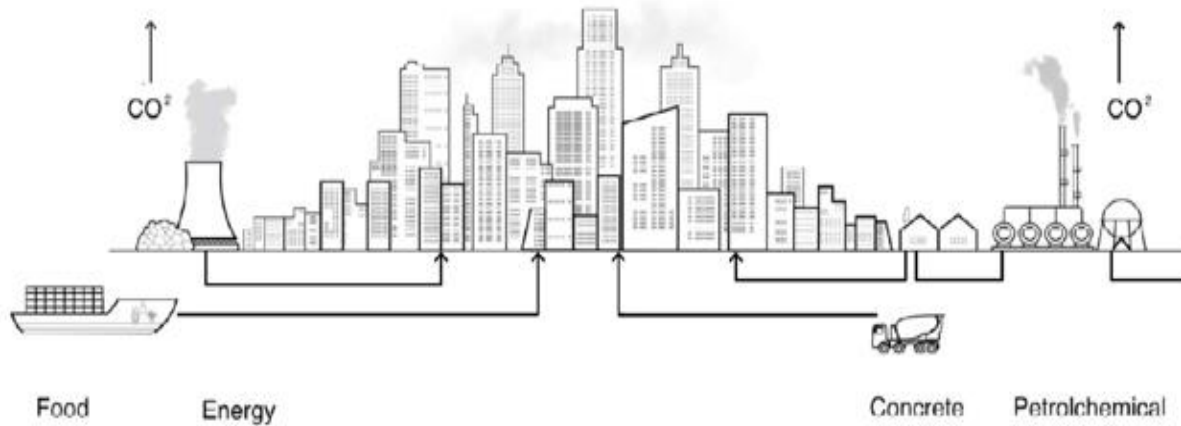
Biocities, è una nuova visione per le aree urbane per guidare la trasformazione dall'attuale economia lineare e basata su risorse fossili a una bioeconomia circolare basata su una relazione nuova e sinergica tra natura e società, economia ed ecologia, aree urbane e rurali (*Bioregion*)



La Biocittà “funziona” come un ecosistema forestale

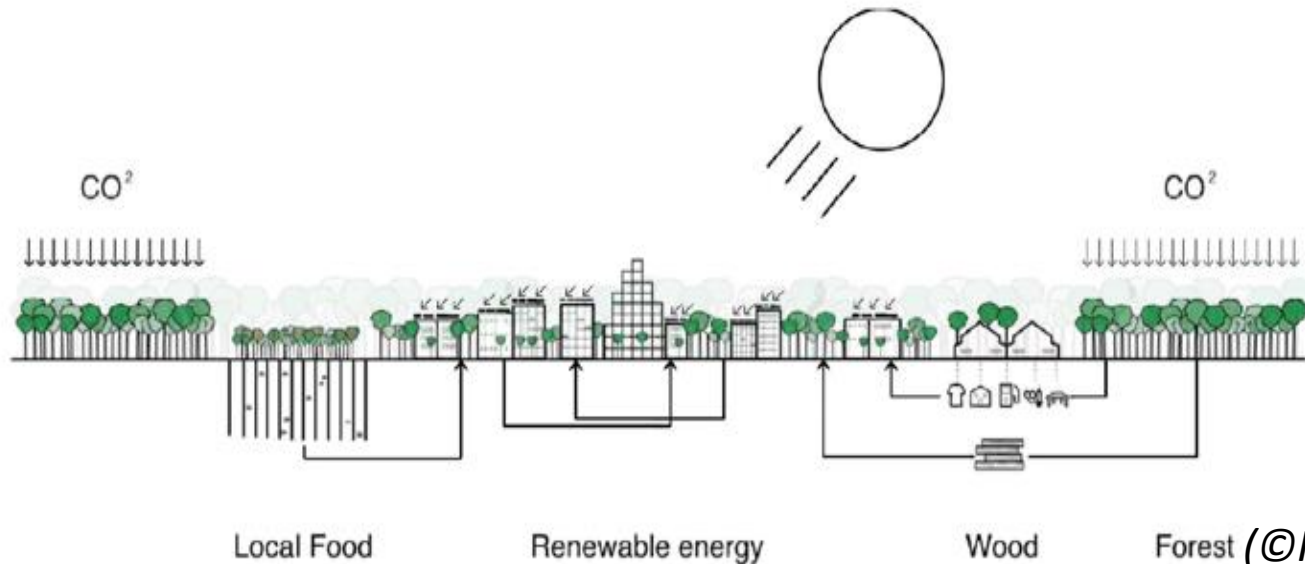
Modern City

Imports goods and produces trash and contamination. This is the model that many advanced cities are abandoning.



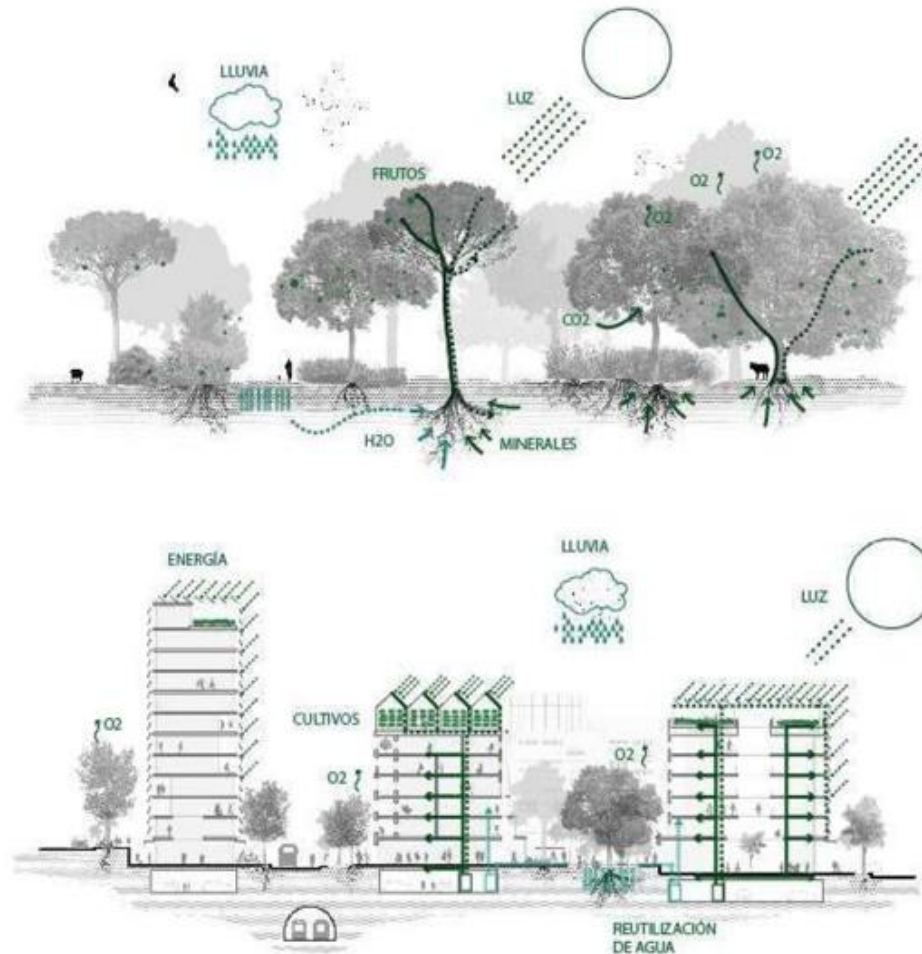
Forest City

It is based in the Circular economy. It's a zero emissions city that produces its energy and use renewable materials.



(©IAAC, 2021)

La Biocittà fondata sulle risorse rinnovabili



(©IAAC, 2021)

Libro Springer su Biocities

studio sostenuto da European Forest Institute per *le forest based solutions* in ambiente urbano

Future City 20

Giuseppe Scarascia-Mugnozza · Vicente Guallart · Fabio Salbitano
Giovanna Ottaviani Aalmo · Stefano Boeri *Editors*

Transforming Biocities

Designing Urban Spaces Inspired by Nature

This edited volume centers around the concept of BioCities, which aim to unify nature and urban spaces in order to reverse the effects of global climate change and inequity. Following this principle, the authors propose multiple approaches for sustainable city growth. The discussed concepts are not only relevant for newly constructed cities, but offer transformative perspectives for existing settlements as well. Placing nature at the forefront of city planning is not an entirely new concept, so the authors build on established ideas like the garden city, green city, eco-city, or smart city. All chapters aim to highlight aspects to develop a city that is a resilient naturebased socio-ecological system. Many of these concepts were formed in an effort to copy the best traits of a forest ecosystem: a home for many different species that build complex communities. Much like many of our forests, urban areas are managed by humans for multifunctional purposes, using living and abiotic components. This viewpoint helps to understand the potential and limitations of sustainable growth.

With these chapters, the authors want to inspire planners, ecologists, urban foresters and decision makers of the future.

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Scarascia-Mugnozza · Guallart
Salbitano · Ottaviani Aalmo
Boeri *Eds.*



Transforming Biocities

Future City 20

Giuseppe Scarascia-Mugnozza
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 Springer

Biocities Research Agenda

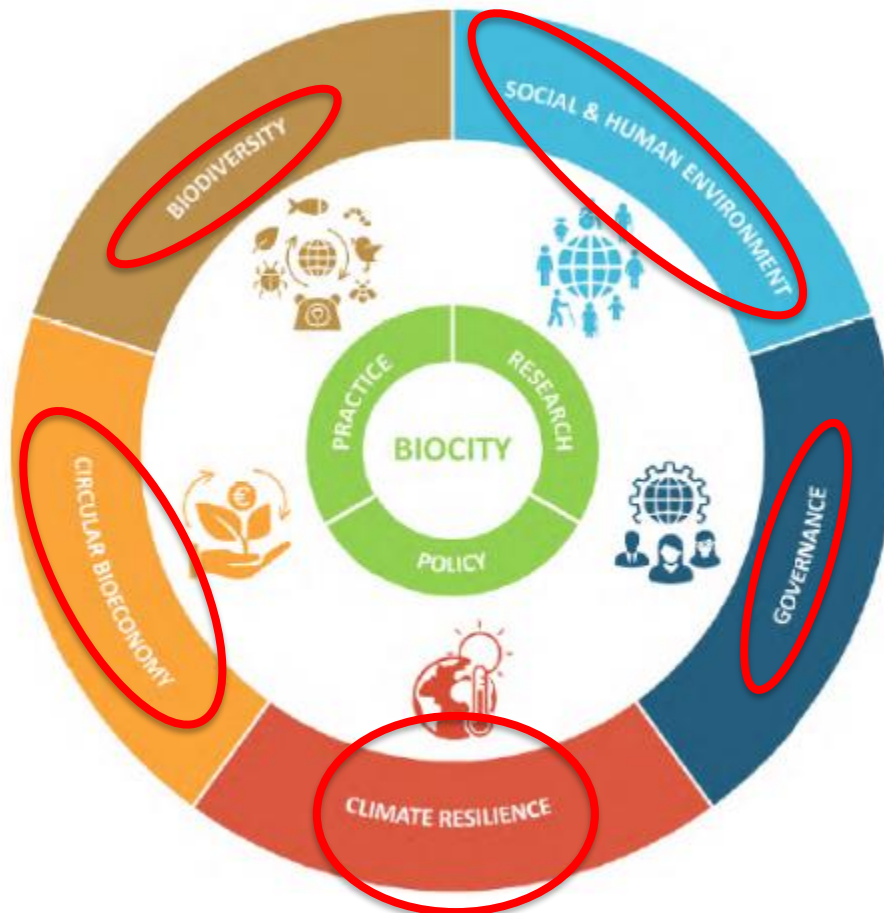


Table 1. Selected priorities and cross-cutting research needs allowing the transition to Biocities

	Governance	Circular bioeconomy	Climate Resilience	Social and Human environment	Biodiversity
Governance		Identifying sustainable practices, policies and SDG-action plans that effectively support the emergence of Biocities			
Circular Bioeconomy	Developing social innovations that support technical innovation and the transition to circularity		Understanding climate mitigation potential of circularity and technical innovation in engineering and building technology.	Identifying ways to make the urban circular bioeconomy truly inclusive and equitable in terms of social, economic and spatial aspects	Assessing the effects of circular strategies on biodiversity.
Climate Resilience	Identifying types of policies that are crucial to avoid catastrophic impacts of climate change.	Understanding the effect of climate change on bioeconomy resources.		Assessing the interlinkages between resilience, human health and biodiversity and identifying the levers to provoke sustaining loops.	Identifying strategies to mitigate the impact of urban climate on urban ecosystem.
Social and Human Environment	Identifying adaptive and co-creating governance models that promote inclusivity and social equity.	Developing social innovations and identifying drivers of cultural change to foster circular and sufficient practices.	Identifying soft infrastructures changing habits and practices in areas of mobility, consumption and circularity.		Identifying approaches to better assess services and dis-services offered by biodiversity in urban ecosystems.
Biodiversity	Determining levers to raise the awareness of long-term benefits of biodiversity conservation among citizens and policymakers.	Balancing the impacts of circularity on biodiversity and other ecosystem services such as resource productivity.	Monitoring and assessing the impacts of climate change on the urban ecosystem.	Mapping and investigating the linkages between biodiversity and human wellbeing.	

Figure 1. Research fields and branches of research used to develop the Research Agenda of Biocities. Source: own representation by the authors.

(Jerylee Wilkes Allemann et al. 2022)

La città è un sistema complesso dove il clima e l'ambiente sono influenzati da edifici, sistemi di riscaldamento e autoveicoli. E dalle interazioni con piante, alberi, foreste urbane e..... con la popolazione umana!!

Photosynthesis: Carbon sequestration



Photochemistry: Ozone & aerosols formation

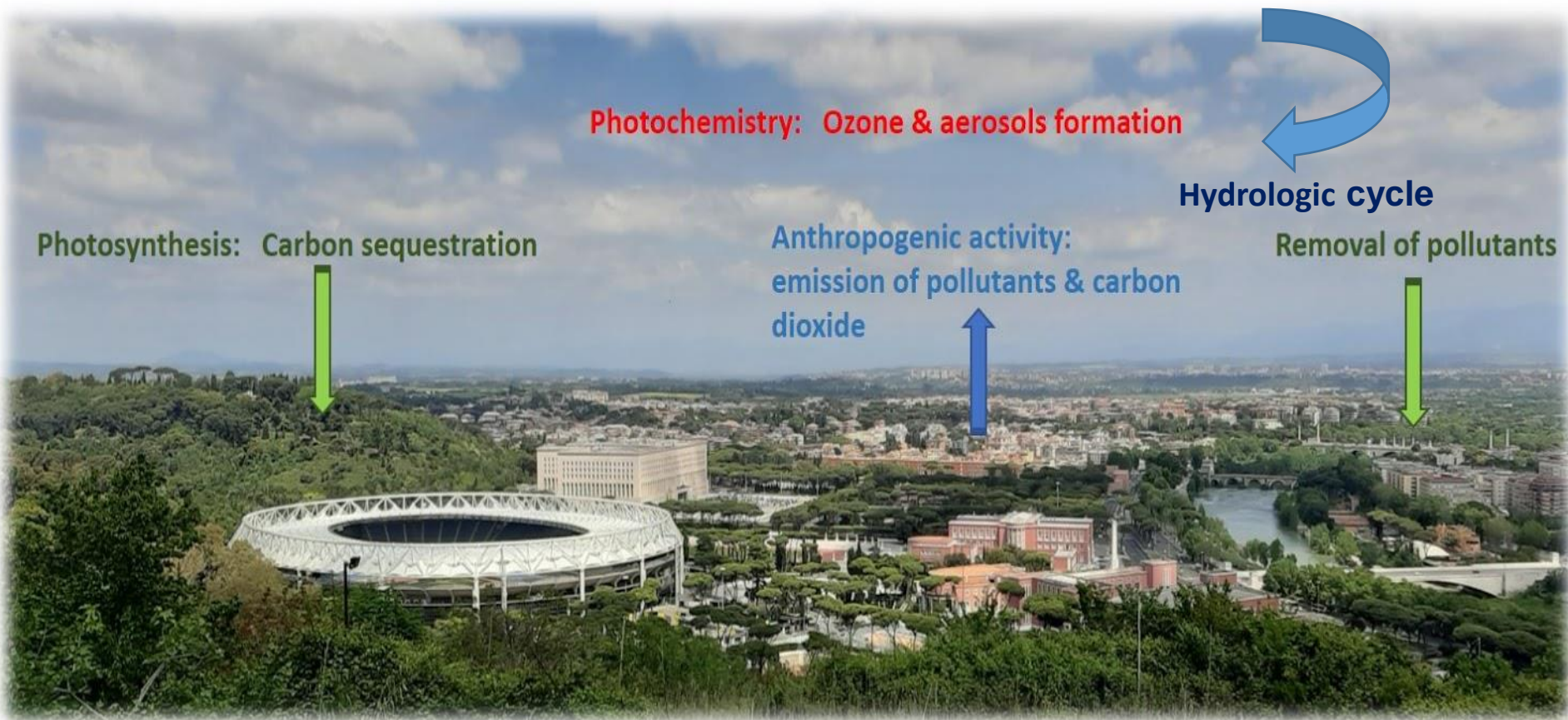
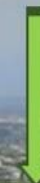
Anthropogenic activity:
emission of pollutants & carbon dioxide



Hydrologic cycle



Removal of pollutants



Alberi e foreste urbane: fonte di una miriade di servizi ambientali



Source : Evaluación de los Ecosistemas del Milenio de España / Millenium Ecosystem Assessment SPAIN



Alberi e foreste urbane: fonte di una miriade di servizi ambientali

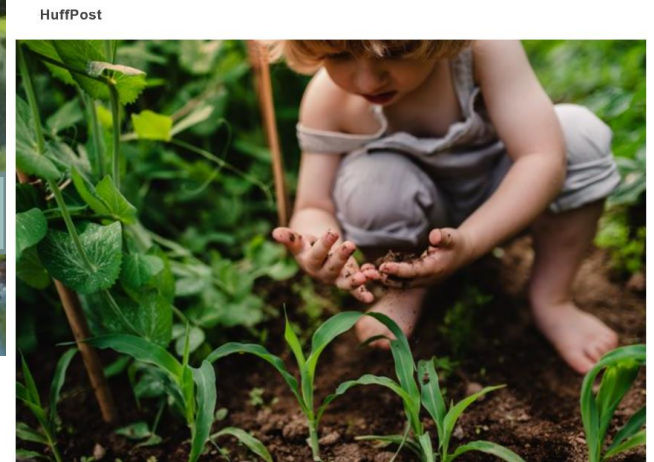
SERVIZI PAESAGGISTICI E CULTURALI



Salute e benessere psico-fisico

Educazione ambientale

Citizen science



HuffPost

HALFPPOINT IMAGES VIA GETTY IMAGES
A little boy in the garden, playing with soil.

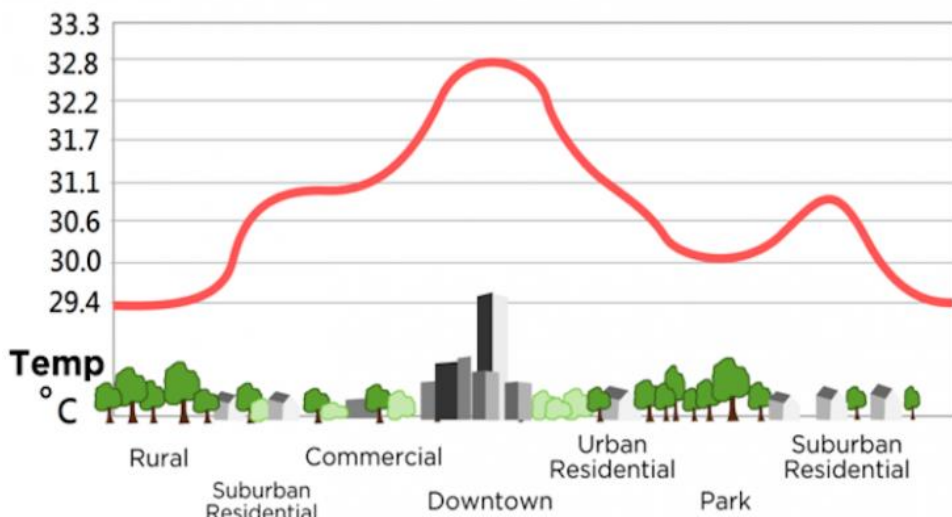
(di Marco Angelillo)

Prendete un cortile in ghiaia di un asilo in una città nordeuropea di medie dimensioni – diciamo 100 mila abitanti – e trasformatelo in un pezzo di bosco:

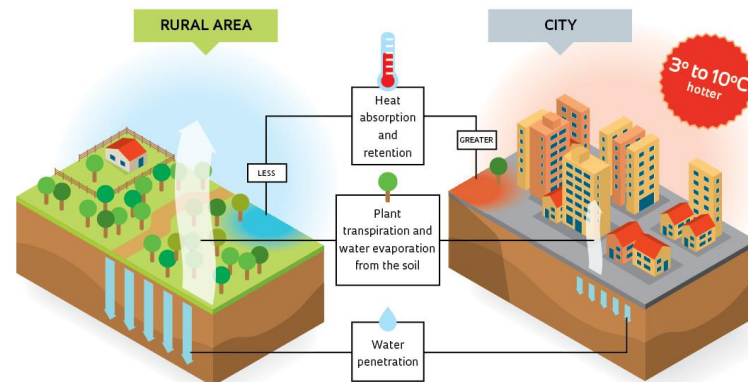


ALBERI E FORESTE URBANE MODIFICANO IL MICRO-CLIMA IN CITTA' E MITIGANO L'EFFETTO "ISOLA DI CALORE" (URBAN HEAT ISLAND)

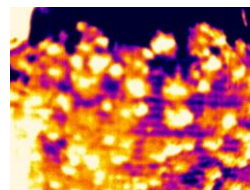
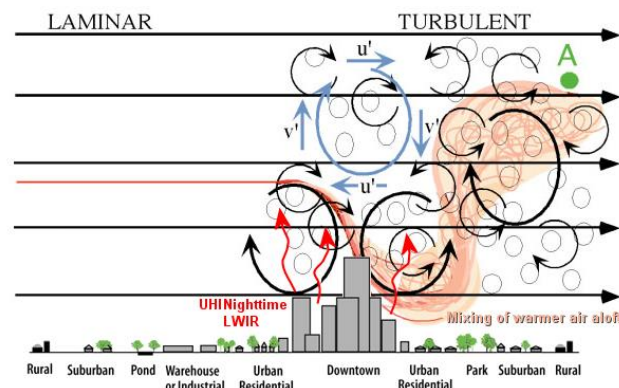
URBAN HEAT ISLAND PROFILE



Why the urban heat island effect occurs



L'evapotraspirazione rimuove il calore e può raffreddare l'aria, piante ed edifici contribuiscono ad aumentare la turbolenza atmosferica che aiuta a dissipare l'energia!



(da Fares 2021)

Castelporziano, una foresta urbana

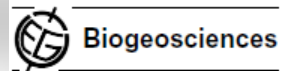
~ 6000 ha, 25 km dal centro di Roma



Misure sulla foresta mista di querce e pini

La rimozione degli inquinanti atmosferici e del C è costantemente misurata nelle foreste urbane e periurbane di Roma

vegetazione dunale costiera



The ACCENT-VOCBAS field campaign on biosphere-atmosphere interactions in a Mediterranean ecosystem of Castelporziano (Rome): site characteristics, climatic and meteorological conditions, and eco-physiology of vegetation

S. Fares^{1,2}, S. Mereu³, G. Scarascia Mugnozza¹, M. Vitale³, F. Manes³, M. Frattoni⁴, P. Ciccioli⁴, G. Gerosa⁵, and F. Loreto¹

Foresta di Castelporziano, una barriera naturale per contenere l'espansione urbana



....con aree umide e dei boschi igrofil



Il supersito ICOS di Castelporziano, Roma

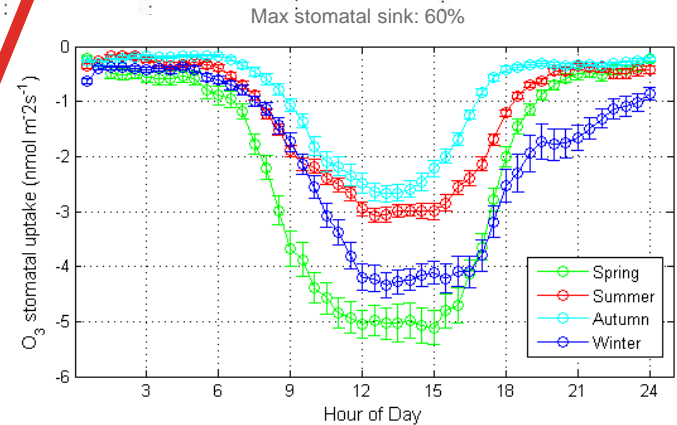
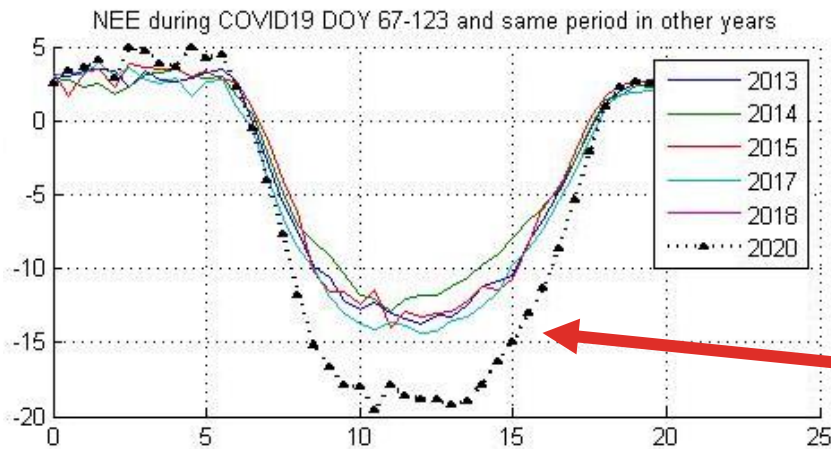
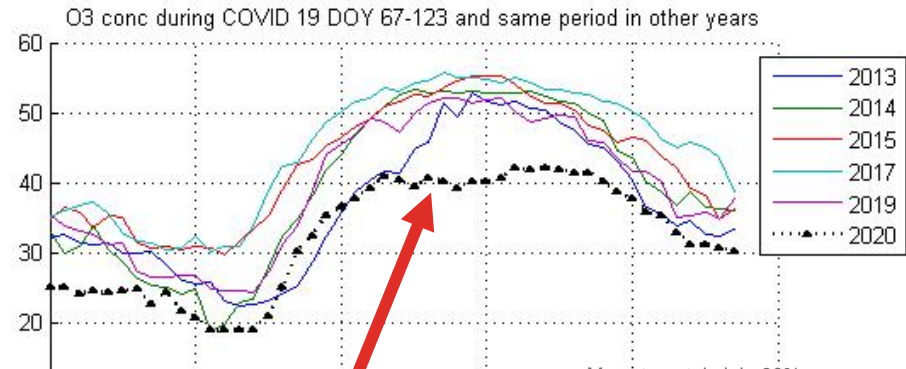
ICOS: *Integrated Carbon Observation System*, una grande infrastruttura europea di ricerca per la misura dei servizi ecosistemici: assorbimento di Carbonio e gas inquinanti, microclima e thermal comfort, servizi ricreativi e culturali



In collaborazione con NBFC-Centro Nazionale Biodiversità, CNR, CREA, Università, Segretariato Generale Presidenza della Repubblica

ASSORBIMENTI DI OZONO E DI CO₂ MISURATI A ROMA SU FORESTA DI QUERCUS ILEX A CASTELPORZIANO

Elevato assorbimento di ozono e sequestro del Carbonio nell'anno di Covid 19 (2020) in rapporto ad anni precedenti



NEE, Net Ecosystem Exchange: sequestro di Carbonio dell'ecosistema foresta

JGR Atmospheres
RESEARCH ARTICLE Influence of Dynamic Ozone Dry Deposition on Ozone Pollution
 10.1029/2020JD032398

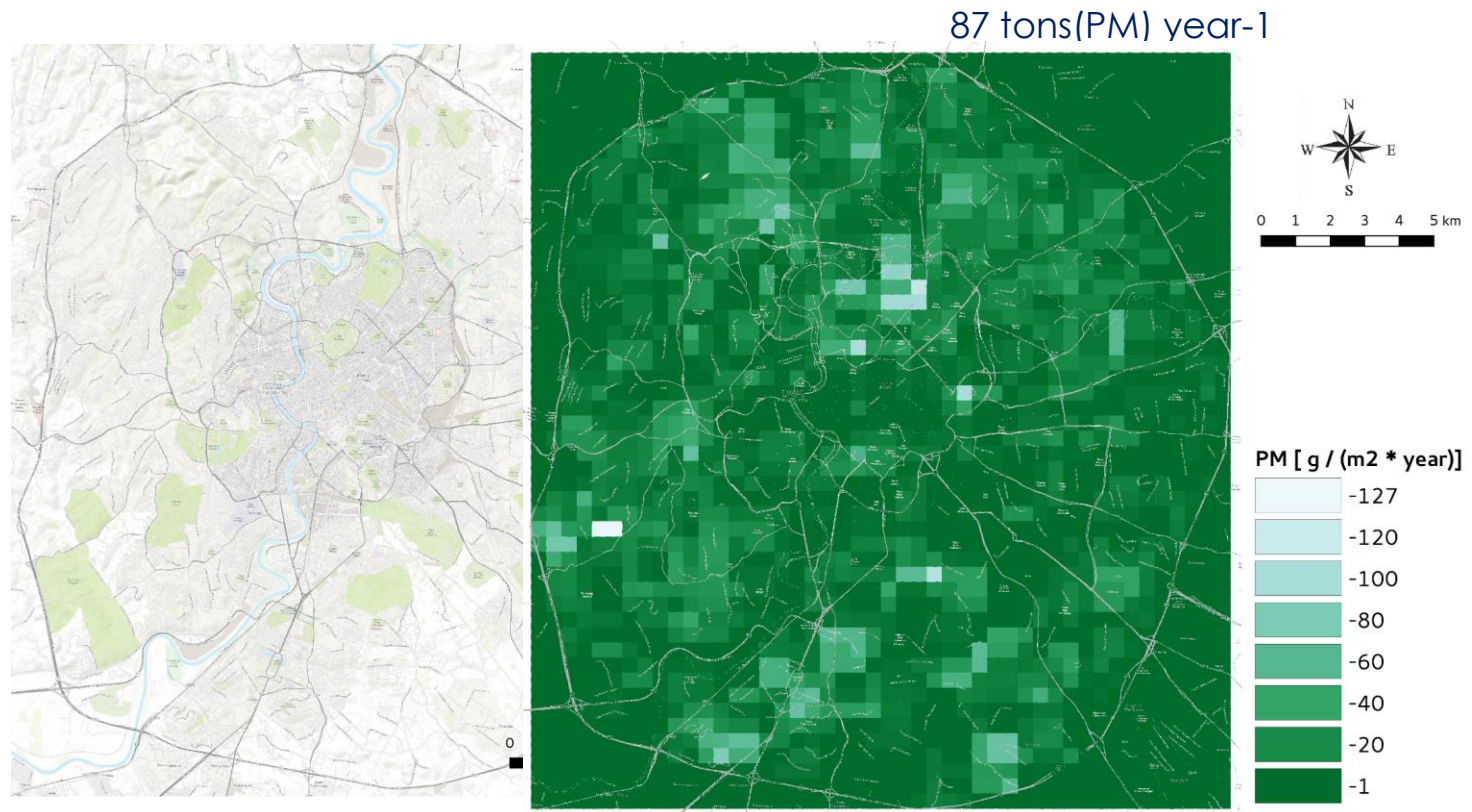
Key Points:
 • Remote and local ozone deposition exhibit strong regional winter season variability
 • Dynamic ozone dry deposition change season surface ozone concentrations and trends regionally

O. E. Chiffolleau^{1,2}, F. Paulot^{1,2}, A. M. Fiolet^{1,2}, L. W. Horowitz³, G. Curran⁴, C. B. Beusink⁵, S. Fares^{1,2}, J. Gaudel^{1,2}, A. H. Goldstein⁶, C. Grosvenor⁷, A. J. Hegg⁸, B. Lambert^{9,10}, I. Manousouli^{11,12}, J. W. Munger^{13,14}, L. Nall^{15,16}, P. Noller^{17,18}, J. Uebling^{19,20}, T. Vuille^{21,22,23}, and E. Wang^{24,25,26}


(da S. Fares 2021)

Distribuzione spaziale dei *sink* forestali/naturali di PM1 e PM2.5 a Roma

Impiego di dati da satellite Sentinel 2 per misurare il grado di copertura forestale/naturale a Roma e così stimare con il modello AIRTREE l'assorbimento di PM1 e PM2.5 da parte di alberi e foreste/parchi urbani




(da S. Fares 2021)



Le «città-spugna», alberi, foreste e campi agricoli per risolvere il problema dei rischi di alluvioni: progettazione del paesaggio in Cina per la sicurezza ambientale

• *Before*



Rinaturalizzare le sponde dei corpi idrici, creando aree di espansione in caso di piene dei fiumi e di alluvioni, tenendo conto del « tempo di ritorno» degli eventi estremi: si creano aree disponibili per la natura, il paesaggio, il benessere e il tempo libero dei cittadini

• *After*

100 Year Flood



20 Year Flood



Dry season



Veduta aerea del parco durante la stagione secca; notare la rigogliosa vegetazione che ricopre le terrazze sull'argine. Le terrazze sono arricchite dal limo che si deposita durante la stagione delle inondazioni

BENEFICI ECONOMICI E BIO-ECONOMIA



<http://www.discoverygreen.com>



<http://www.boscoverticale>
stefanoerarchitetti.net



<http://www.boscoincitta.it/>



La città a bioeconomia circolare



(©IAAC, 2021)



Edifici in legno si stanno diffondendo nel mondo: una priorità anche per Green New Deal Europeo



10-storey - Australia

9-storey - London

14-storey - Bergen ³⁶

Gli alberi abbattuti dalla tempesta Vaia “trasformati” in due palazzi. Ecco il cantiere di un progetto speciale



Palazzi in legno di 9 piani, i più alti d'Italia a Rovereto

Vantaggi delle strutture in legno:

- Molto più leggero del calcestruzzo e acciaio, ottima resistenza ai terremoti
- Elevata sostenibilità ambientale e accumulo del C per anni



Test on vibrating table to simulate KOBE earthquake 2007, Miki (Japan), Progetto SOFIE (Italy)

(per gentile concessione del Prof. Ceccotti – CNR IVALSA)

A wide-angle photograph of a cityscape viewed from an elevated park. The foreground is dominated by lush green trees and a dirt path where a person is riding a bicycle. In the middle ground, there are more trees and some buildings. In the background, a large stadium with a distinctive red and white facade is visible, surrounded by other city buildings under a clear blue sky.

Grazie!

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